KEENLEYSIDE POWERPLANT PROJECT

Recreation Component - Environmental Studies

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KEENLEYSIDE POWERPLANT PROJECT

RECREATION COMPONENT - ENVIRONMENTAL STUDIES

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For

B.C. HYDRO AND POWER AUTHORITY

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B.C. HYDRO

This impact assessment is based on the "Keenleyside Powerplant Project Engineering Description" prepared in November 1982. Since that time, ongoing planning and design studies have resulted in some changes that would affect the project description. The principal changes are as follows:

- In-service date has changed from 1992 to 1994 and the optional in-service date of 1990 is no longer being considered.

- Installed capacity has changed from 210 MW to 180 MW with corresponding changes to powerhouse design.

The above changes have been incorporated in the report only where they would affect the results of the impact assessment.

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SUMMARY

The major goal of the Recreation Component of the Keenleyside Powerplant Project Environmental Studies was to extend the inventory and mapping of outdoor recreation features along Arrow Lakes Reservoir northwest of the Murphy Creek Project. In addition, any potential impacts of the Powerplant Project upon recreation capability were to be identified.

The most significant recreation opportunities within the study area are fishing, boating, water skiing and swimming in Arrow Lakes Reservoir and fishing immediately downstream from the Hugh Keenleyside Dam on the Columbia River. Recreational use on uplands in the study area is limited by poor road access and steep topography.

Syringa Creek Provincial Park is a significant regional recreation facility found within the study area. It is located on the north shore of Arrow Lakes Reservoir approximately 7 kilometers west of Hugh Keenleyside Dam and features facilities for overnight camping, boat launching, beach activities and day-use recreation. In the vicinity of the park are three small private marinas.

The potential impacts of the Keenleyside Powerplant Project upon outdoor recreation are expected to be low. There appears to be a few slight to moderate negative impacts in the short-

term during construction while long-term impacts are expected to be beneficial in the form of improved angling opportunities downstream from the dam.

The most significant potential for negative impact upon outdoor recreation would be the temporary disruption of fishing immediately downstream from Hugh Keenleyside Dam. Placement of the office and construction camp near this site and turbidity resulting from cofferdam construction would result in displacing this sport fishing for one or a few seasons.

Under the existing Assured Operation Plan and assuming operating Regime 1, the timing and amount of drawdown of Arrow Lakes Reservoir would change little with construction and operation of the proposed powerplant. As a consequence, no impact is anticipated upon recreation opportunities associated with the reservoir such as swimming, fishing and boating. However, adoption of reservoir operating Regime 2 (which features less seasonal drawdown on Arrow Lakes Reservoir) would enhance recreational opportunities along the shoreline of the reservoir.

1. INTRODUCTION

The work carried out for the outdoor recreation component of the Keenleyside Powerplant Project largely represents an extension of studies completed for the Murphy Creek Project. A major goal was the inventory of recreation features, the results of which appear on two 1:10,000 aerial photograph mosaics which are part of the Resource Atlas. A further goal was to identify any potential impacts of the Keenleyside Powerplant Project upon recreation capability. Detailed terms of reference are found in Appendix A.

From a recreational point of view, the study area included all lands portrayed on the 1:10,000 air-photo mosaics. This represents approximately 80 square kilometers extending along Lower Arrow Lake for about 16 kilometers and including uplands to an elevation of 1,200 meters. The study area also included lands and waters within 10 kilometers downstream of the Hugh Keenleyside Dam and below El. 500 meters.

2. METHODOLOGY

In a manner very similar to that used for the Murphy Creek Project, the Ministry of Environment method of recreation capability inventory was used to map recreation features within the Keenleyside Powerplant Project study area. Using 1973 1:16,000 and 1978 1:40,000 aerial photographs, recreation features were identified and assessed. Such features included streams, beaches, shorelands, topographic patterns and vegetative cover. This permitted assessment of the general suitability of areas for boating, camping, picnicking, fishing, viewing, hiking and nature appreciation. A brief visit to the study area combined with knowledge gained from other recent studies in the region helped confirm the mapping from air-photo interpretation.

The recreation and tourism study carried out for the Murphy Creek Project by Edwin, Reid and Associates Ltd. provided important background information. Comments regarding regional recreational characteristics and recreation features inventory found in the Edwin, Reid report apply generally to the Keenley-side Powerplant Project as well.

The Murphy Creek Project study entailed considerable data gathering, analysis and tabulation regarding recreation use and user preferences in the study area and region. It was felt

that there was little need to duplicate this effort for the Keenleyside Powerplant Project. Comments in this report regarding recreation use are mainly derived from the Murphy Creek study augmented by discussions with regional resource managers and data provided by the Parks and Outdoor Recreation Division of the Ministry of Lands, Parks and Housing.

3. RECREATION FEATURES

The two 1:10,000 mosaic maps portray the inventory of recreation features. Figure 1 provides a summary map depicting the most significant features in the study area. Lower Arrow Lake is the central attraction of the Keenleyside Powerplant Project area. Extending northwards to the vicinity of Revelstoke, the Arrow Lakes Reservoir is part of a 500 kilometer-long navigable waterway in conjuction with the Columbia River extending into the United States. The lock at Keenleyside Dam provides movement of pleasure craft between the Arrow Lakes and downstream sections of the Columbia River.

Being a controlled impoundment, the natural shoreline and beaches of the Arrow Lakes Reservoir have been flooded. For the most part, existing beaches are predominately rubble and unsorted materials which are poorly suited to bathing, swimming and popular recreation activities. Drawdown on the lake is normally about 20 meters and the lowest levels are experienced during the Spring. The lake fills during late Spring and early Summer and relatively stable and high water tables are maintained from mid-July through to the Winter. As noted by Edwin, Reid, 1981, Arrow Lakes Reservoir "suffers from severe log debris."

Regardless of the above limitations, Lower Arrow Lake remains a significant water body for recreation. It provides good

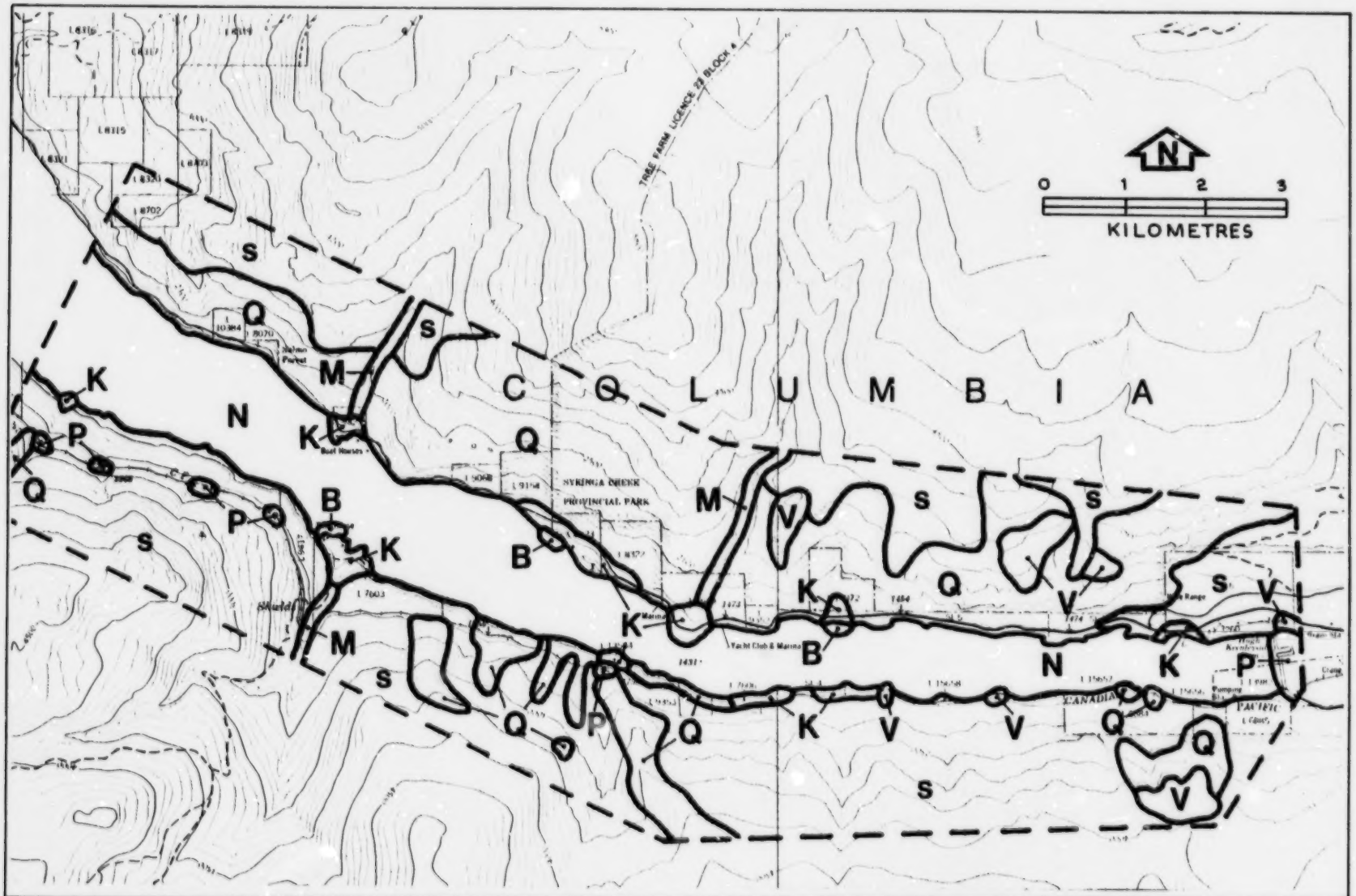

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Figure 1. Summary Recreation Features

B BEACHES
K CAMPING/PICNICKING CAPABILITY
M SMALL STREAMS
N RESERVOIR BOATING AND ANGLING
P MAN-MADE FEATURES
Q ATTRACTIVE UPLANDS (HIKING, VIEWING, WILDLIFE)
S AREAS OF LOW RECREATION SIGNIFICANCE
V SUPERIOR VIEWING

fishing and moderate opportunities for boating, water skiing and swimming. The most important areas associated with the lake are the relatively level fluvial fans at the mouths of the major creeks - generally identified by a "K" on Figure 1. Much of the terrain adjacent to Lower Arrow Lake is mountainous while these small sites provide good opportunities for campsite and picnic site development. These areas also have potential for beach development or improvement. The mouths of Syringa, Tulip, McCormick, Moberly and Cub creeks represent the major areas of significant recreation development potential along with areas of level terrain west of Syringa Creek (in the Provincial Park) and east of McCormick Creek. Attractive sand beaches are found at the mouths of Moberly and Allandale creeks and in Syringa Creek Provincial Park.

Uplands adjacent to Lower Arrow Lake have moderate recreation significance. The most extensively distributed attractive upland areas are found on the south facing slopes along the north side of Lower Arrow Lake. Here, upland terrain is generally steep but frequent rock outcrops, grasslands, open forests and wildlife viewing potential provide high quality opportunities for viewing, hiking, riding and nature appreciation. Similar opportunities are found south of Lower Arrow Lake but on a much more restricted and localized basis. On Figure 1 these attractive uplands are indicated by the symbol "Q".

Uplands identified by an "X", especially areas south of Lower Arrow Lake, are comprised of monotonous, closed forest cover on relatively steep terrain with low recreation significance.

Certain upland promontories and shoreland units provide superior views overlooking Lower Arrow Lake and the valley. These areas are indicated by "V" on Figure 1.

Most of the streams within the study area are small or intermittent and of low scenic or recreational importance. However, Syringa, Tulip and Moberly creeks offer modest scenic variety and picnicking potential. A shallow gorge along lower Tulip Creek is the most interesting feature associated with streams in the area.

Man-made features contribute to scenic potential. Hugh Keenleyside Dam is the most important site in this regard. Additional man-made attractions include three interesting railroad trestles and two short tunnels along the C.P.R. right-of-way between Cub Creek and Hugh Keenleyside Dam.

The two 1:10,000 recreation features maps in the Resource Atlas provide relatively detailed assessment of recreation opportunities in the study area. Definitions for the outdoor recreation features symbols used on the 1:10,000 maps are found in Appendix B.

4. RECREATION FACILITIES

There is excellent access to Arrow Lakes Reservoir via the highway which is located along the north shore of the lake west from Hugh Keenleyside Dam. The road serves Syringa Creek Provincial Park which represents the major recreation facility within the study area. The location of major recreation facilities are portrayed by Figure 2.

Syringa Creek Park is a Class A park of 152 hectares. It features both day-use and overnight facilities which include 60 campsites, 91 day-use tables, boat launching and a developed beach. Additional lands are currently being included in the park so that entire portions of Lots 9154, 8323, 9322 and 7669 will eventually be all Class A parkland.

Further west there are two areas of U.R.E.P. (areas reserved for the use and recreational enjoyment of the public) along the north shore of Arrow Lakes Reservoir within the study area. These areas include Lot 9429 at the mouth of Tulip Creek (Parks Branch file #1-3-1-42) and Lot 8070 about one kilometer further west (Parks Branch file #1-3-1-57). A small site on the south shore of Arrow Lakes Reservoir across from Tulip Creek used to be an U.R.E.P. (#1-3-1-46). It is now shown as a Lands Service Recreation Reserve (#0174888) on B.C. Forest Service reference maps in Victoria. The site appears to have

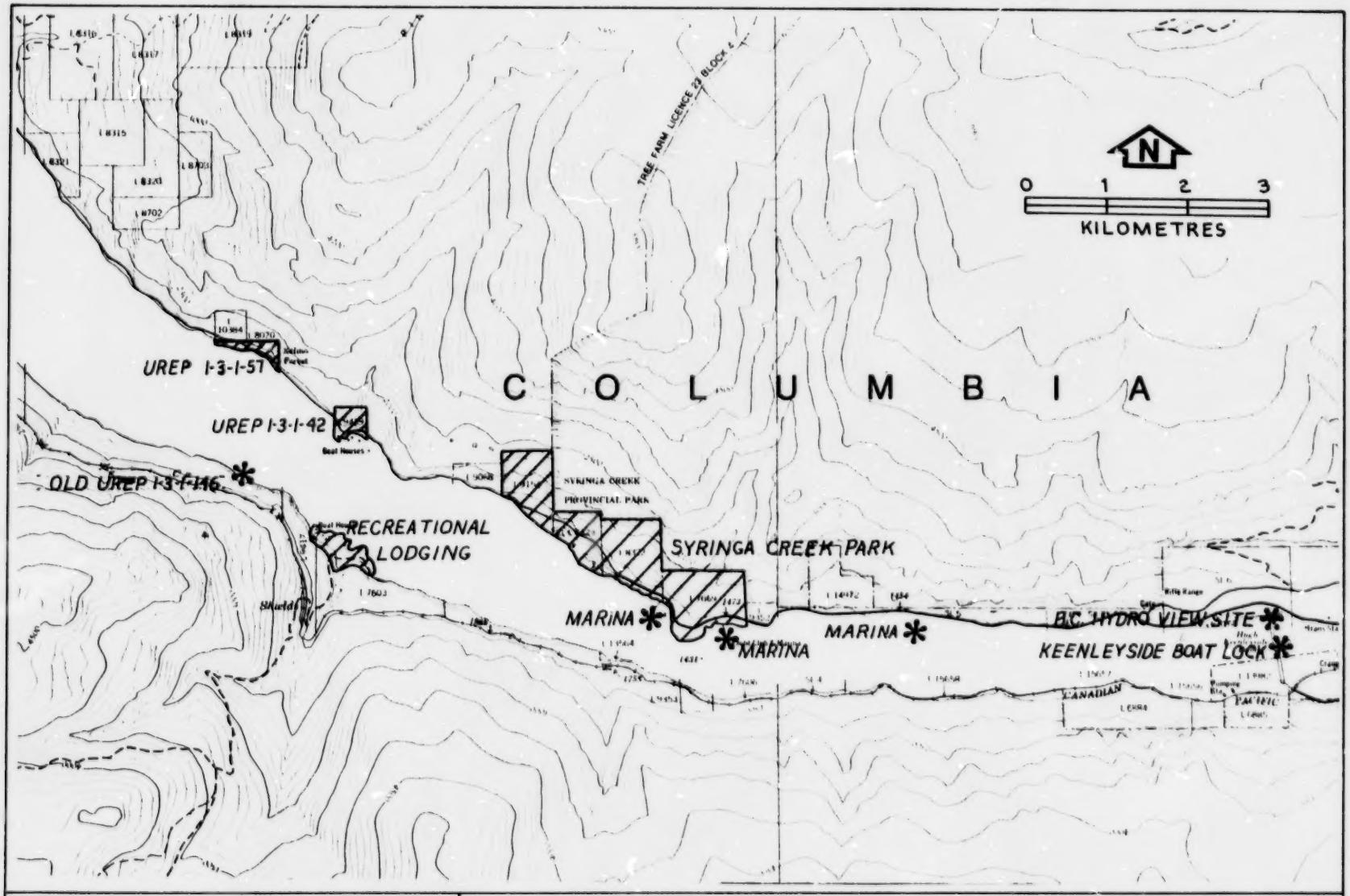

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Figure 2. Recreation Facilities

low recreation capability and low priority because most of the favourable land associated with it is now covered by the reservoir.

Three small private marina facilities are found on the north shore of Arrow Lakes Reservoir. Woods Marina and the Arrow Boat Club are found on either side of the fan at Syringa Creek while a more recently established facility is found offshore from District Lot 4595, Sub-lot 5.

Access along the south shore of Arrow Lakes Reservoir is restricted although the C.P.R. railroad provides potential for foot travel adjacent to the shore in the eastern portion of the study area. From Highway 3 which is located about twelve kilometers to the south, a secondary road serves the locality of Shields and the fan at the mouth of Moberly Creek. This area supports a small number of residences and recreational cottages on the shore of the reservoir.

5. RECREATION USE

The Edwin, Reid (1981) report provides comprehensive data regarding recreation use for the Murphy Creek Project area as well as the region generally. These data do not provide recreation use statistics of direct value when assessing the Keenleyside Powerplant Project. Furthermore, for the Keenleyside Powerplant Project, recreation use surveys were not warranted. General observations regarding recreation use at Lower Arrow Lake are made based on Parks Branch data and consultations with regional resource managers.

With regard to the Keenleyside Powerplant Project there are two areas of significant recreation use: (1) fishing just downstream from Hugh Keenleyside Dam, and, (2) water-based recreation associated with Lower Arrow Lake. Recreation use in the uplands appears to be restricted to some hunting and hiking; current use of the uplands is limited by poorly developed road access combined with the relatively steep topography.

Sport fishing on the Columbia River between Hugh Keenleyside Dam and Castlegar is presently one of the most important outdoor recreation activities in the combined Keenleyside-Murphy Project area. Although kokanee, burbot and Dolly Varden char are sought, the most important aspect of this activity is the high quality rainbow trout fishing. The fishing is characterised by a relatively small number of local people

who intensely fish the area. For instance, a Fish and Wildlife Branch creel census indicates that 90% of the fishermen are from local communities who fish for a relatively short duration averaging 1.29 hours 57 times a year. Close to half (45%) of the fishing occurs in Summer while 29% occurs in the Spring, 19% in the Fall and 6% in the Winter, (Edwin, Reid, 1981).

Based on Edwin, Reid's survey of residents, the Arrow Lakes Reservoir is the most important area for boating, water skiing and wildlife viewing in the region. Picnicking, fishing, camping, swimming and sightseeing were also identified as highly significant activities at Arrow Lakes Reservoir by local residents. (Edwin, Reid, 1981).

Syringa Creek Provincial Park is the focus for most of the recreation activity occurring on Lower Arrow Lake. Parks and Outdoor Recreation Division statistics indicate that there were 3,855 campground party visits and 23,940 day-use party visits in 1981. In addition to camping and picnicking, the park is a focus for swimming and boating. The Tulip Creek area is also used for unorganized boat launching, picnicking and general public access to the lake.

Three marina facilities at Syringa Creek are also important centres for boating and fishing use.

Residences near the mouth of Moberly Creek generate the only recreation use along the south shore of Lower Arrow Lake within the study area.

In addition to boating and fishing activity centred at Syringa Creek and Syringa Creek Park, the Hugh Keenleyside Lock provides access for pleasure craft between Arrow Lakes and the Columbia River. In 1978 a total of 158 pleasure boats used the lock while 137 used it during the summer months of July and August in 1980, (Edwin, Reid, 1981).

6. POTENTIAL IMPACTS

Overall, the potential impacts of the Keenleyside Powerplant Project upon outdoor recreation are expected to be slight. There appears to be a few slight to moderate negative impacts in the short-term while long-term impacts upon recreation are expected to be positive. Table 1 summarizes the general types and degree of impact potential.

Table 1. Summary of Potential Impacts Upon Outdoor Recreation

RECREATION ACTIVITY/ OPPORTUNITY	RELATIVE DEGREE OF IMPACT		
	SHORT-TERM (CONSTRUCTION PERIOD) IMPACT POTENTIAL	LONG-TERM (OPERATING) IMPACT POTENTIAL	
	OPERATING REGIMES 1 OR 2	OPERATING REGIME 1	OPERATING REGIME 2
Lower Arrow Lake water-based recreation use and potential	none	none	positive
Pleasure boat use of Hugh Keenleyside Lock	none	none	none
Upland Recreation & local road access	slight	none	none
Columbia River sport fishing	moderate	slightly positive	slightly positive
Demand upon recreation resources and facilities from powerplant construction workforce	moderate	none	none
Borrow pit visual factor	slight	slight	slight

Two reservoir operating regimes have been identified by B.C. Hydro following proposed installation of power generation facilities at Hugh Keenleyside Dam. Regime 1 would essentially be the same as existing reservoir operation featuring a normal full pool level of 440.1 meters from July to December accompanied by a normal year's drawdown of about 19 meters which reaches minimum levels during the month of April. Regime 2 would be similar except that total drawdown during normal years would be reduced by about seven meters.

Operating Regime 1 poses very little change to the existing situation in terms of the timing and amount of drawdown on Arrow Lakes Reservoir. As a consequence, no impact is anticipated upon shorland and water-based recreation opportunities along the reservoir. Furthermore, no impact upon boating between Arrow Lakes Reservoir and the Columbia River is expected because the Powerplant Project would not result in disruption of operation of the Hugh Keenleyside boat lock.

Operating Regime 2 would reduce seasonal drawdown on the reservoir most years which in turn would benefit recreational opportunities during the Spring and early Summer. At the present time, when the reservoir is drawn down, boat launching is very difficult and useable portions of beaches are isolated from the water's edge by up to several hundred meters of dry

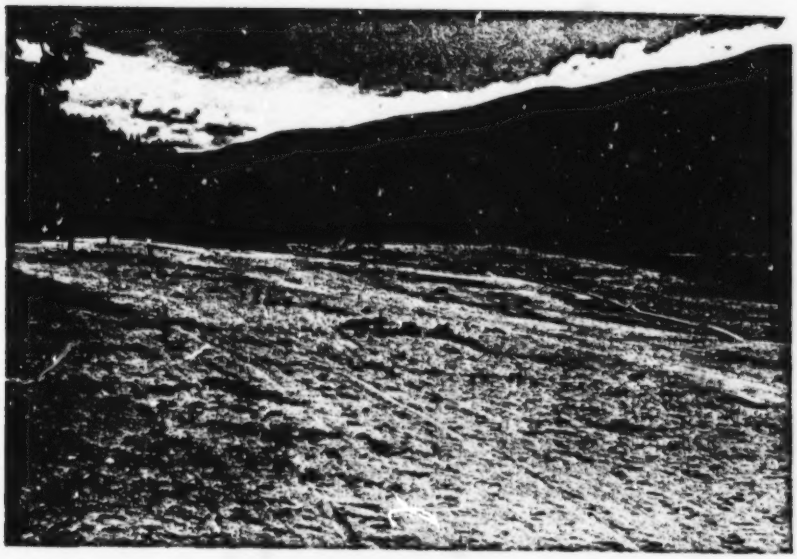

Figure 3. Beach and Day-Use Area at Syringa Creek Park

Figure 4. View East Towards Tulip Creek Fan

These photographs, taken May 18, 1982 illustrate the effects of drawdown during spring and early summer. The shoreline and beaches are isolated from the water's edge by an expanse of rubble. Adoption of reservoir Operating Regime 2 would lessen this drawdown most years thus enhancing recreational opportunities such as boat launching, beach activities and picnicking.

terrain. Operating Regime 2 would minimize this effect during most years representing a positive impact resulting from the Powerplant Project. This benefit would also extend beyond the current study area and applies to the total Arrow Lakes Reservoir as far north as Revelstoke.

Ideal reservoir levels from a recreation point of view appear to be slightly less but within one meter of the normal full pool level of 440.1 meters. This would be an important factor to bear in mind during any evaluation of future operating regimes for Arrow Lakes Reservoir.

Construction activities such as obtaining aggregate and till may have a slight impact upon wildlife distribution on south-facing slopes overlooking the Hugh Keenleyside Dam to the immediate north. In turn, this may result in a very slight negative impact upon hunting opportunities. Similarly, disruption of traffic across the dam and relocation of the Robson-Broadwater Highway are expected to have a very slight impact upon tourist and recreation traffic travelling to Arrow Lake Reservoir.

The most significant potential for impact upon outdoor recreation would be the probable short-term disruption of fishing immediately downstream from Hugh Keenleyside Dam. During construction of the downstream cofferdam (probably in years

two and three of the project), turbidity could displace the sport fishery downstream from the dam for a season or so.

Furthermore, the location of the office and construction camp would temporarily discourage public access to fishing opportunities near the dam site during installation of the powerplant facilities. In the long run however, passage of water through the generation turbines is expected to lower total dissolved gas saturation resulting in a beneficial impact upon downstream fish populations. (R.L. & L. Environmental Services, 1982).

Some impact is expected as a result of the powerplant construction labour force placing added demands upon existing recreation facilities and opportunities. The peak labour force would involve approximately 540 workers. This would pose a slight short-term impact upon the demand for facilities such as at Syringa Creek Provincial Park. The most significant impact in this regard would be the added pressure upon the local sport fishery. Approximately 13% of British Columbia residents are fishermen - based on the fact that there were 361,231 resident fresh water angling licences issued during fiscal year 1980-81 and the total population of the province in 1981 was 2,744,467. This means that a minimum of 13% or 70 new fishermen might be added to the local sport fishery for a period of up to four years. This may represent a significant short-term added

demand upon the Columbia River fishery because of the proximity of the construction camp to the important fishing areas between Hugh Keenleyside Dam and Castlegar. At the same time, however, this will occur when turbidity resulting from cofferdam construction is taking place and therefore when fishing activity in this section of the river would be largely displaced anyway.

The existing Balfour till borrow pit approximately four kilometers east of the dam and between the 600 and 750 meter level on slopes northwest of Robson poses an existing and minor negative impact upon visual quality. Borrow requirements for the Keenleyside Powerplant Project are expected to be relatively low (140,000 cubic meters) with the consequence of a very slight addition to the existing negative visual feature.

Two other minor impacts are removal of Hugh Keenleyside Dam viewpoint and disruption to informal day-use beach activity at a site near Lot 3260 just west of the Hugh Keenleyside Dam on the north shore of the reservoir.

Estimated recreational impacts in terms of user-days have not been determined for the Keenleyside Powerplant Project. The Edwin, Reid Murphy Creek Project Recreation and Tourism report does not provide user-day information for particular locations within either the Keenleyside or Murphy Creek study

areas and interpolations for the Keenleyside area are not possible. Furthermore, the terms of reference for the Keenleyside Powerplant Project did not allow for gathering user-day information and the low level of anticipated impacts does not appear to warrant the relative high cost of gathering such data.

CONTACTS

Gary Ash, fisheries consultant, R.L. & L. Environmental Services, Edmonton, Alberta.

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APPENDIX A

TERMS OF REFERENCE

3 February 1992

KEENLEYSIDE POWER GENERATION

Terms of Reference
ENVIRONMENTAL STUDIES

1.0 INTRODUCTION

Prior to signing the Columbia Treaty in 1961 and its ratification in 1964, numerous studies were made of the hydroelectric development of the Columbia River in Canada. The Treaty between the United States and Canada led to the construction of Mica and Hugh Keenleyside projects on the Columbia River in Canada. The Revelstoke project on the Columbia, now under construction, is not a Treaty project.

Keenleyside dam was constructed at the outlet of Lower Arrow Lake near Castlegar, above the confluence of the Kootenay River. The project, completed in 1968, was for the purpose of water storage and contained no power generation facilities.

Since 1977, B.C. Hydro has been studying the Murphy Creek project, which would be located on the Columbia River, 35 km downstream of Keenleyside dam. Three reservoir elevations were studied; the lowest level (424 m) would allow the installation of a powerhouse at Keenleyside. The Murphy Creek project, if built, would not be a Treaty project.

Environmental information on the proposed Murphy Reservoir has been collected for levels 430 m, 427 m and 424 m. These terms of reference are for detailed environmental studies of the addition of Keenleyside power generation to the Murphy Creek 424 m case. All environmental studies should assume Murphy 424 m and identify any changes or

incremental impacts caused by the Keenleyside project. All discussions should clearly specify the differences between the two scenarios.

The Keenleyside reports are intended to be read in conjunction with the Murphy Creek documents, and therefore should avoid duplication of baseline data wherever possible.

Information on the study area without further hydroelectric development, and on the impacts of Murphy 424 m, is available in existing Murphy Creek environmental reports.

Study objectives, organization, liaison and methodology are the same as described in the Murphy Creek terms of reference.

B.C. Hydro will supply information on project description and schedules, operating regime, and will make available environmental reports on Murphy Creek.

2.0 STUDY AREA

The study area consists of all lands and waters below 500 m elevation within 10 km of Keenleyside dam. The study area for fisheries should include the lower Arrow Reservoir and the future Murphy Creek Reservoir (or the Columbia River as far south as Trail). The study area for socio-economics and resource evaluation should include local communities of the Columbia Valley.

(a) Reporting Procedures

Written reports will be required for all sections of the studies. Five draft reports and 45 final reports will be required. Draft reports will be prepared and submitted for review by B.C. Hydro and, where necessary, by outside experts before they are accepted. All final reports shall be in a form suitable for release to government agencies and the public. Following completion of all

the reports for the sections, B.C. Hydro will prepare an integrated summary report in consultation with the authors of the sections and outside experts, where necessary.

(b) Studies Schedule

The studies will be undertaken in early 1982. A target schedule showing specific deadlines will be issued for each section.

(c) Studies Sections

The following are guidelines for each of the sections. These guidelines distinguish between inventory and assessment work. Where feasible this distinction should be made in report preparation.

Study sections are:

A Aquatic Resources
B Vegetation, Agriculture and Forestry
C Wildlife
D Heritage Resources
E Socio-economic Resources
F Recreation
G Land Use
H Water Use
I Resource Atlas
J Resource Evaluation

SECTION F - RECREATION

1.0 OBJECTIVES

1. To extend the Murphy Creek Resource Atlas to cover areas potentially affected by the Keenleyside Generation Project.

2. To identify potential impacts of Keenleyside project components on recreation capability.

2.0 METHODOLOGY

(a) Inventory

Using the same symbols and format as the Murphy Creek Resource Atlas, map recreation information within the study area.

(b) Assessment

1. Discuss the effects, if any, of Keenleyside construction and operation on recreation capability. Comment on any impacts or benefits in capability from possible changed water regime in the proposed Murphy Creek reservoir.

2. Provide input to the campsite study with respect to impacts of camp location on recreation.

APPENDIX B

OUTDOOR RECREATION FEATURE DEFINITIONS

OUTDOOR RECREATION FEATURE DEFINITIONS

The following outdoor recreation feature definitions are used on the 1:10,000 recreation feature maps in the Resource Atlas. The definitions are similar to those found in the Murphy Creek Project report but with some qualifications for conditions found in the Keenleyside Powerplant Project area.

A^1 Sport Fishing - identifies areas suited to angling in the Keenleyside Project area; this primarily refers to rainbow trout fishing in Lower Arrow Lake.

B^1 Sand Beach - small areas of sand beach found in Syringa Creek Provincial Park.

B^3 Rocky Beach - identifies the extensive areas of exposed beach along Lower Arrow Lake found during low water levels in Spring and early Summer.

E^5 Mixed Forest - identifies mixed coniferous/deciduous tree cover such as the frequently occurring second growth forests on uplands with limited recreaation significance.

E^6 Open Parkland Forest - identifies recreationally significant open forests and grasslands (usually Ponderosa pine, Douglas-fir or aspen) providing highly attractive landscapes for viewing, hiking and riding; these areas frequently coincide with ungulate winter range and also provide opportunities for wildlife viewing and nature study.

K Development Potential - identifies sites suitable for development as organized campgrounds or picnic sites; such areas are highly significant and usually feature level to gently rolling topography, good soil drainage, proximity to streams or recreational water and adequate tree cover.

L^6 Steep Slopes - identifies a small gulley on lower Tulip Creek with modest scenic qualities.

M Small Streams - identifies small streams with moderate to low significance for picnicking, viewing and wildlife observation.

Nx Large Open Water - identifies Lower Arrow Lake as providing opportunities for boating.

P^1 Man-Made Features - identifies Hugh Keenleyside Dam and railroad trestles and tunnels which add to the visual qualities of the study area.

Q^1 Mountainous Topography - identifies extensive areas of steep, mountainous terrain of relatively low recreation significance; when accompanied by grasslands and open forest cover (ie., in association with E^6) these slopes are moderately important visually and offer some opportunities for hiking and riding.

Q^2 Hiking Uplands - identifies significant upland areas of subdued relief forming terrain suited to hiking, riding and exploration; this feature is invariably found in association with E^6, open forest cover.

Q^3 Shoreland - identifies shoreland areas along Lower Arrow Lake which may not be ideally suited for intensive recreation development but which offer limited development potential and are aesthetically important in the region.

R^1 Rock Formation - identifies distinctive rock formations and outcrops which are common to the study area.

V Viewing - identifies promontories and ridges featuring superior opportunities for landscape viewing.